Moonlight Amphibian and Western Pond Turtle Survey

Plumas National Forest

Final Report, January 2017

Prepared by:

MGW Biological

I. EXECUTIVE SUMMARY

The Moonlight amphibian and western pond turtle survey project is located on the Plumas National Forest, Plumas County, CA within and surrounding the footprint of the Moonlight Fire which occurred in 2007. The purpose of this two year, two visit amphibian and western pond turtle survey was to facilitate the implementation of the Sierra Nevada Forest Plan Amendment. The results of the survey will assist land managers in managing the resources within the boundaries of the Sierra Cascade Province. The target species for these surveys included foothill yellow-legged frog (*Rana boylii*), Sierra Nevada yellow-legged frog (*Rana sierrae*), western pond turtle (*Actinemys marmorata*), and California red-legged frog (*Rana draytonii*). Nine individuals of Sierra Nevada yellow-legged frog were detected in four different locations during surveys over the two-year project: 4 locations in the Lone Rock Creek drainage, and 1 location in the Boulder Creek drainage. One foothill yellow-legged frog was detected in Lower Indian Creek in 2016.

II. LITERATURE REVIEW

Several documents were reviewed prior to and during surveys, to ensure that surveys were completed strictly according to protocol, and that they were being completed with safety precautions to prevent spread of amphibian disease. These included:

- **A Standardized Protocol for Surveying Aquatic Amphibians**, Gary M. Fellers and Kathleen L. Freel, National Biological Service Cooperative Park Studies Unit, May 1995. (http://www.werc.usgs.gov/ProductDetails.aspx?ID=1032)
- **Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog**, United States Department of the Interior, Fish and Wildlife Service, August 2005.
- **Western Pond Turtle Survey Techniques,** Devin Reese, June 2000.
- **Preventing Transfer of Amphibian Disease between Field Locations**, Gary Fellers.
- **Amphibian Chytridiomycosis: An Informational Brochure**
- **What to do with Amphibian Specimens with possible Chytrid Fungus**, form.
- **Preventing spread of aquatic invasive organisms common to the Pacific southwest region 03-2014, Operational Guidelines**

Other literature including field guides for western herpetofauna was also consulted prior to and during surveys.

III. METHODS

Survey Planning

We used all available information and literature provided by the Government and prior knowledge of amphibian survey techniques and the project area to develop a Survey Plan to meet the specifications and requirements of this contract. This included identification of the survey crew members, timeline and approach to working through the Government-designated habitat, proposed

methodology, equipment and materials, safety plan, and Quality Control Plan. The Government did not previously name each stream reach. Thus, we created a naming system for streams that consisted of either:

- Stream name as labeled on USGS topographic maps for main channels
- Numbered tributaries of main stream channels
- Meadows labeled with a prefix of "M"
- Springs and seeps numbered with a prefix of "SPR"
- Lakes and ponds with same name as labeled on USGS topographic maps
- See Figure 1 for an example

Visual Encounter Survey Methods

Surveys began on May 27, 2015 and were completed on October 30, 2015 and resumed on May 19, 2016 and were completed on December 9, 2016. The streams and lake/ pond perimeters were walked slowly and the banks scanned thoroughly while searching slack water, overhangs, basking sites, and ahead with binoculars for animals. Surveys of springs and meadows were conducted by searching for any water or wet mud and following channels through the alders and willows until the beginnings of the channels. MGW surveyors completed about 1.5 to 2.5 miles of stream or lakeshore per day, depending on hiking conditions and proximity to the next stream reach.

We attempted to prioritize surveys on springs and intermittent streams for survey early each season, and perennial streams later, to maximize the surveyable habitat encountered throughout the survey season. Large stretches of dry streambed, dry springs, meadows, lakes and ponds were considered non-habitat and were not surveyed but were noted on non-habitat tracking logs which were submitted to the Government.

Surveys were conducted according to the Fellers and Freel (1995) protocol (see above). Surveys of streams were conducted by single surveyors, except in the case of Indian Creek, which because of its width and volume of water, often required two surveyors simultaneously surveying either side of the stream channel. In addition, all clothing and equipment contacting the water were disinfected according to the protocols addressing the spread of chytridiomycosis discussed in the Literature Review section above. Specific techniques that all surveyors employed on this project are as follows:

- Use of searching sticks or dipnets to carefully search beneath overhanging stream banks, under logs/rocks in hopes of eliciting movement from amphibians.
- Use of water thermometers to record water temperature in the creeks, ponds, and springs of the survey area.
- Use of binoculars in the more open areas where surveyors could see up to 15 meters ahead.

- Walking or wading along and within the creek upstream and directly along the border of the creek for the best vantage point to discover amphibians.

A search for habitat for western pond turtle was conducted and concentrated on the larger ponds and lakes with emergent vegetation and downed wood or other structures for basking sites. When found, surveys for this species according to the specific protocol were performed.

All amphibian and reptile species and species on Plumas National Forest's list of threatened, endangered, proposed, sensitive species, species of special concern, birds of conservation concern and species of interest that were detected were recorded on data forms. Locations of target species were recorded, flagged, and GPSed.

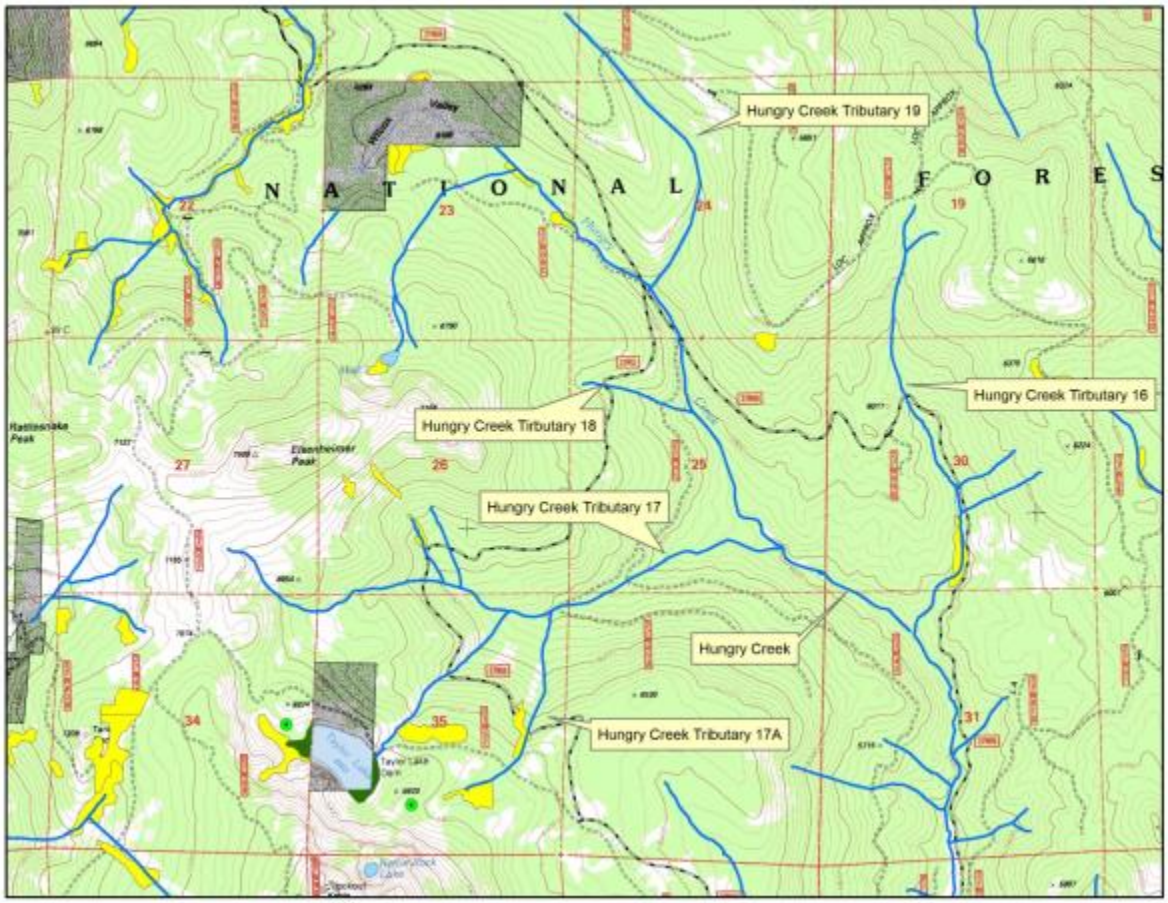


Figure 1. Example of naming system for tributaries of major streams. Tributaries are numbered consecutively moving upstream from main stream's confluence with watershed (river or larger creek). Branched tributaries are given letters in alphabetical order.

Determination of California Red-legged Frog Habitat

A search for potential California red-legged frog (CaRLF) habitat was conducted throughout all habitat in the project area that fell 5500ft in elevation or below. Key features that indicated potential

CaRLF habitat included ponds and backwaters of streams with standing water into July, emergent vegetation and/or dense, shrubby riparian vegetation, higher water temperatures and little to no flow (US Fish and Wildlife Service 2002). When discovered, these potential CaRLF sites were documented with photos, a description, and UTM coordinates, and were presented to the Government for approval to include in protocol-level surveys.

California Red-legged Frog Protocol Survey Methods

We began surveys by the fourth week of June after proposed surveys were approved by the Government. Every attempt was made to implement at least one daytime survey during the breeding season (prior to June 30). Protocol surveys adhered to the *"Revised Guidance on Site Assessment and Field Surveys for California Red-Legged Frogs", including forms, August 2005, United States Department of the Interior, Fish and Wildlife Service"*, which included the following details:

- Each survey site was planned to be surveyed four times, with 2 one to two-hour day surveys and 2 one to two-hour night surveys (time length depended on size of pond), which totaled up to eight hours of survey time at each site, when possible.
- Some survey sites dried up before completing the four surveys.
- There were at least 7 days between two day surveys or two night surveys at the same site.
- Night surveys began one hour after sunset and were finished by midnight.
- Surveys were conducted over a six week time span.
- At least one of the four site visits was conducted by August 15, as per the current protocol.
- Surveys were conducted by scanning the shoreline and emergent and submergent vegetation for adults, subadults, larvae and egg masses of the CRLF, and all other amphibian species (as to differentiate, if not CRLF).
- Surveys during the day employed the use of binoculars to scan areas that were difficult to reach, such as deep, murky pools with thick sediment bottoms that would be dangerous or impossible to reach by walking or by dip net.
- A dip net was used to occasionally sample the water for potential CRLF, and other aquatic life (again, as to differentiate from CRLF). This was completed in areas that allowed access, and that were in prime potential hiding or sitting areas for CRLF. This method varied with access, site size, and available habitat.
- Night surveys employed the use of headlamps and/or a strong flashlight to view possible eyeshine from night-active amphibians. If eyeshine was noted by the biologist, every attempt was made to identify the species of the individual.

For some of the larger, deeper pond surveys, a kayak was used to more effectively survey the habitat.

IV. RESULTS

A. Sierra Nevada *(Rana sierrae)* and foothill (*Rana boylii)* Yellow-legged Frog Detections

Two target species were detected during surveys, Sierra Nevada yellow-legged frog (*Rana sierrae*) and foothill yellow-legged frog. In 2015, six *R. sierrae* individuals in five separate locations were detected (Figure 2). Four *R. sierrae* individuals were found in three different locations on the Lone Rock Creek watershed (Figure 2). Two individuals, a male and a female, were detected together in a tributary of Boulder Creek (Figure 3). In 2016, one female *R. sierrae* was detected in Lone Rock Creek while two likely *R. sierrae* were detected in Boulder Creek just above Antelope Lake (Figure 2). These were quick, unconfirmed visual detections of a definite Ranid frog, and was most likely *R. sierrae*. Also in 2016, a likely *R. boylii* was detected in Indian Creek below Genessee Valley (Figure 4). Though the surveyor could not confirm *R. boylii* vs. *R. sierrae*, the habitat association and elevation (~3600ft) strongly suggest *R. boylii*.

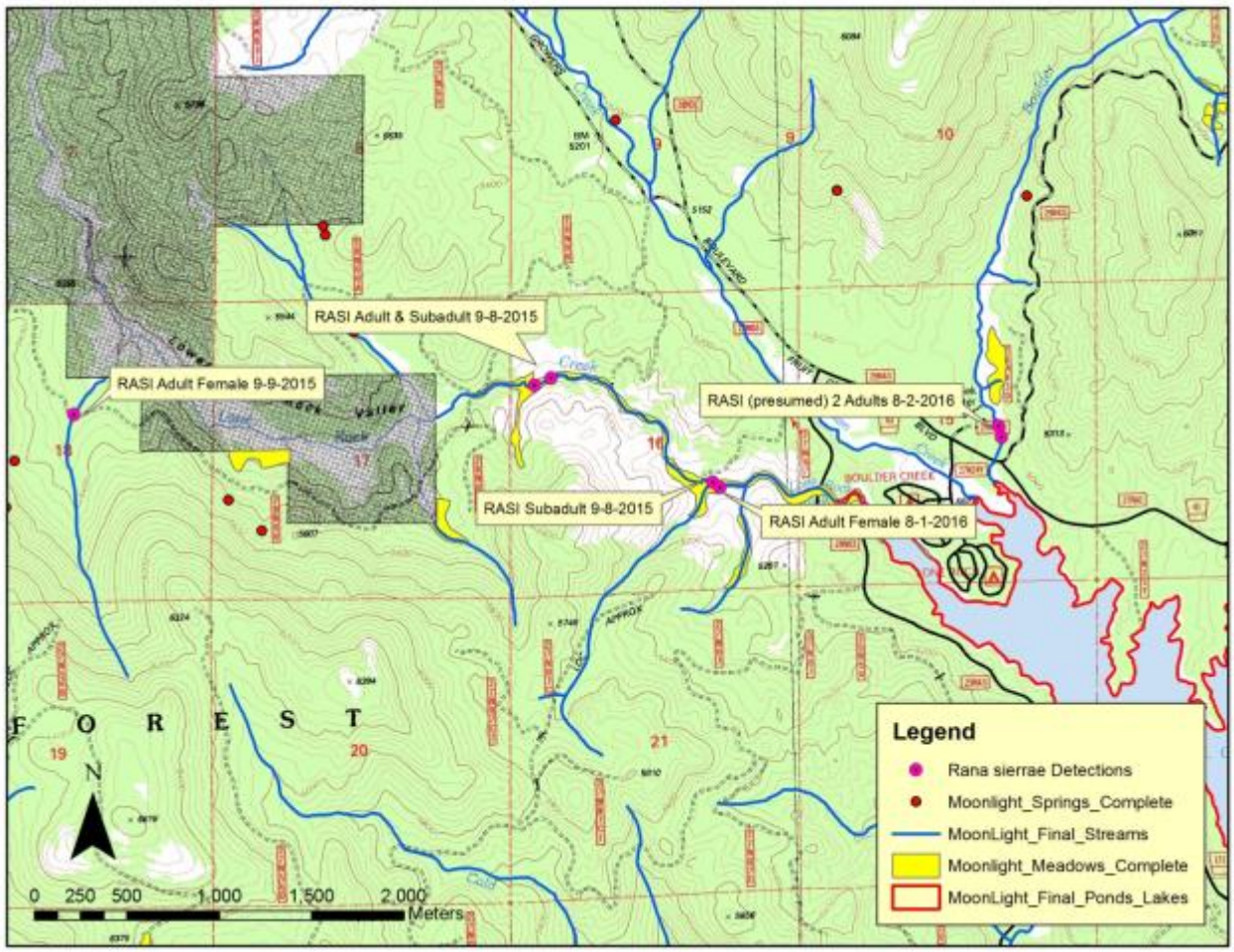


Figure 2. Locations of *Rana sierrae* (RASI) detected in the Lone Rock and Boulder Creek watersheds for the Moonlight Amphibian and Western Pond Turtle Survey project on the Plumas National Forest, 2015-2016.

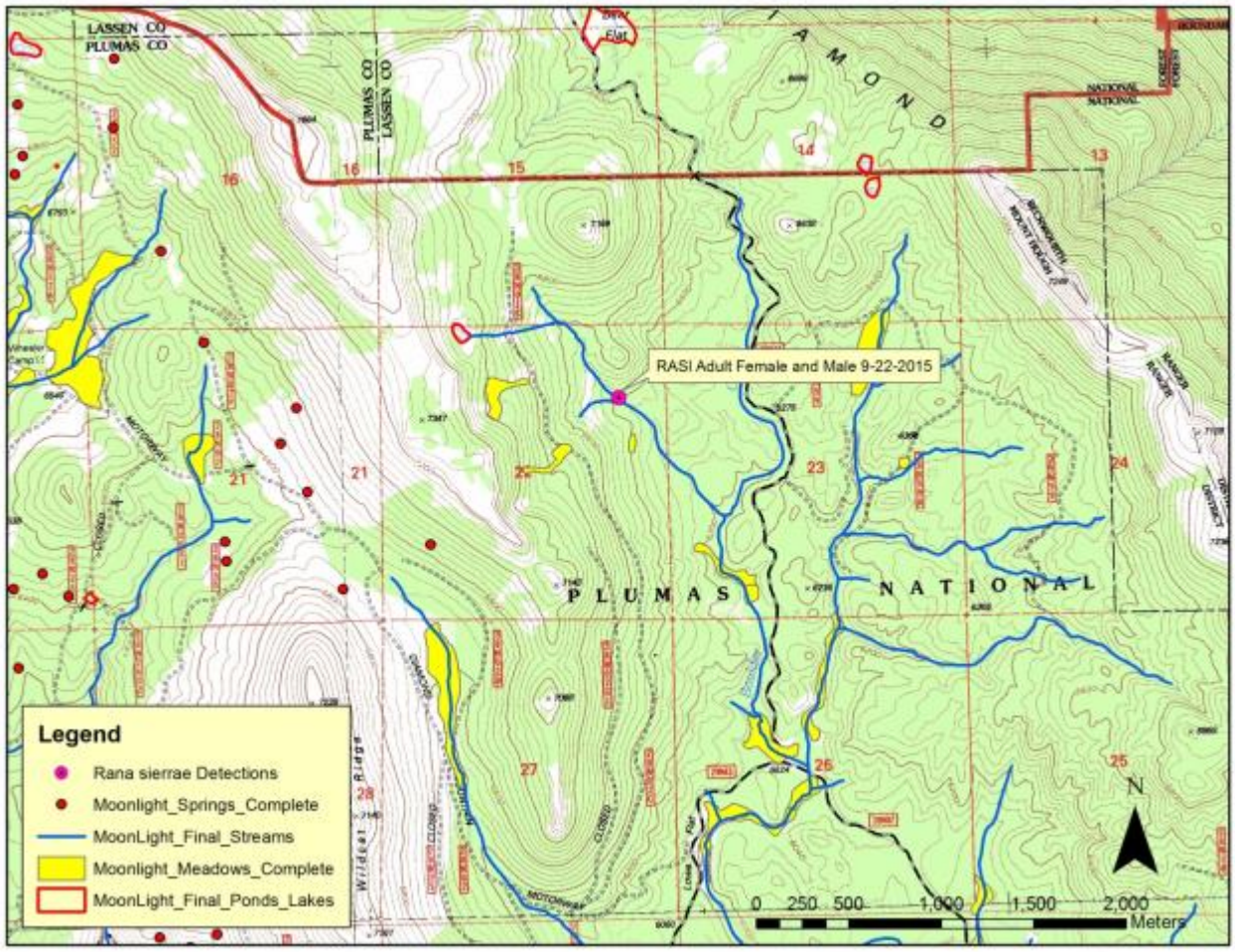


Figure 3. Locations of *Rana sierrae* (RASI) detected in the upper Boulder Creek watershed for the Moonlight Amphibian and Western Pond Turtle Survey project on the Plumas National Forest, 2015-2016.

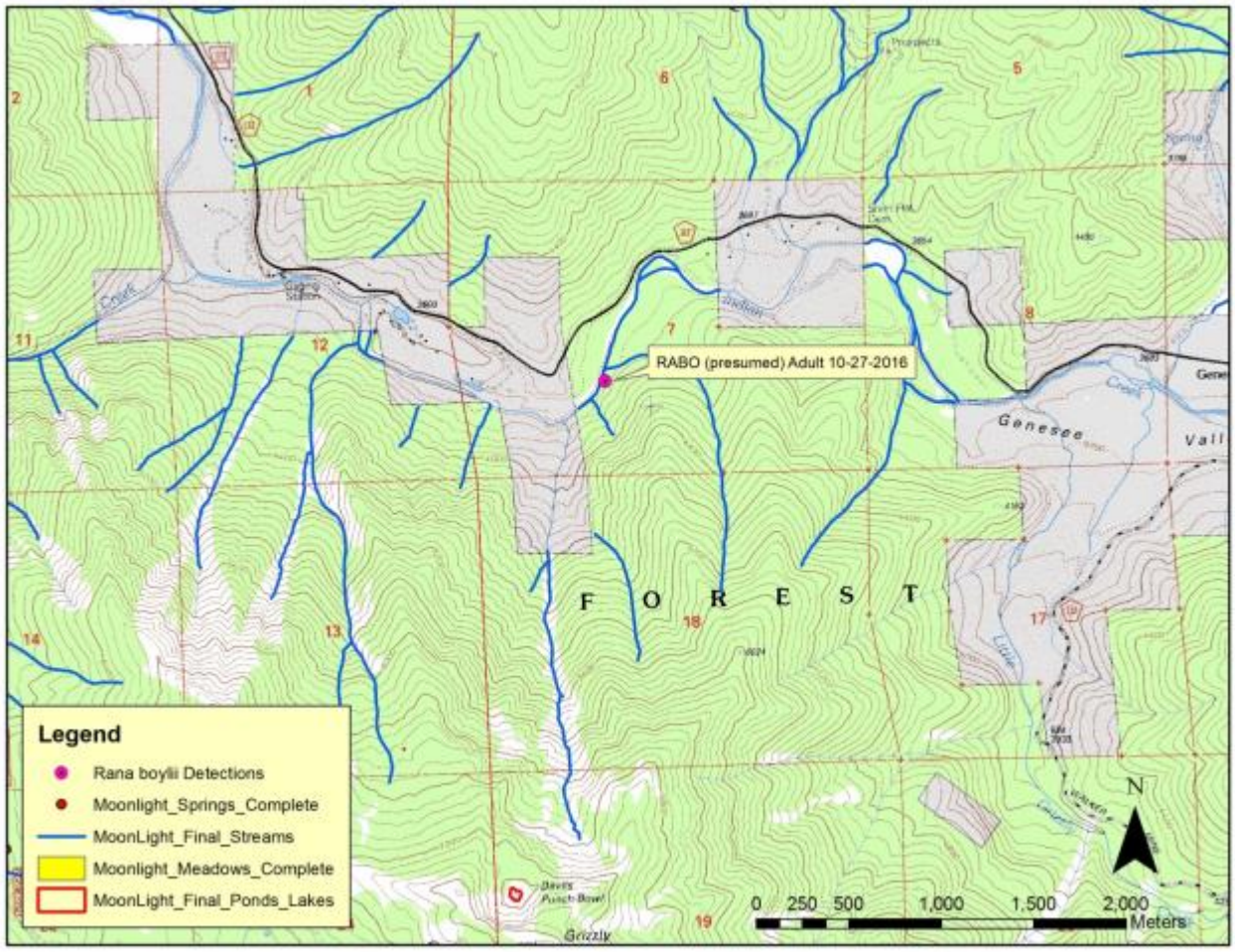


Figure 4. Location of *Rana boylii* (RABO) detected in the lower Indian Creek watershed for the Moonlight Amphibian and Western Pond Turtle Survey project on the Plumas National Forest, 2015-2016.

B. Western Pond Turtle (*Actinemys marmorata*)

Only one piece of habitat was found to be suitable for western pond turtle, Antelope Lake. Due to its size, two protocol-level surveys were performed in the highest quality habitat coves each year (those which had suitable basking sites for pond turtles). No pond turtles were detected during surveys.

C. California Red-legged Frog (*Rana draytonii*) Habitat and Surveys

Several habitats were deemed to be potentially suitable for California red-legged frogs as follows:

M056 Pond (UTM: 706365E 4449378N; 5030' elevation): This is a large pond (approx. 100m X 35m) surrounded by cattails (*Typha* spp.) and willows (*Salix* spp.) with emergent cattails and other vegetation. Depth is likely several meters deep. It is bordered by a wet meadow which drains into Antelope Lake. Canopy cover is almost 0% as it falls within a recent burn scar.

M091 Pond (UTM: 706872E 4449093N; 5050’ elevation): This is a large pond (approx. 125m X 25m) surrounded by willows (*Salix* spp.) with emergent brush. Depth is likely several meters deep. It is bordered by a thin wet meadow which drains into M056 and then into Antelope Lake. Canopy cover is almost 0% as it falls within a recent burn scar.

Antelope Creek Pond (UTM: 706863E 4451480N; 5000' elevation): This is a mid-sized pond created as a backwater by backflow from a culvert and level ground from a wet meadow and Antelope Creek. It is approximately 10m by 20m, approximately 1m deep, and is surrounded partially by willows. There is emergent vegetation in the form of sedges and other forbs. It is likely ephemeral based on the level of Antelope Lake.

Elephants Playground Pond 1 (UTM: 702189E 4438783N; 5200' elevation): This is a mid-sized pond (20m X 30m) but deep (up to 5m). Most of the surrounding and emergent vegetation is sedges, reeds, and other forbs. It is at the top of a long, wet meadow, and is likely ephemeral (it was dry in October 2015). Canopy cover approaches 0% due to its location within a meadow.

Elephants Playground Pond 2 (UTM: 702152E 4438823N; 5200' elevation): This is a small pond (10m X 10m) with depths up to 3m. Most of the surrounding and emergent vegetation is sedges, reeds, and other forbs. It is at the top of a long, wet meadow, and just downslope of Elephants Playground Pond 1. It is likely ephemeral (it was dry in October 2015). Canopy cover approaches 0% due to its location within a meadow.

Moonlight Valley Pond 4 (UTM: 686637E 4455215N; 5440' elevation): This is a small pond (15m X 6m), likely associated with cattle activity, with depths up to 3m. Most of the surrounding and emergent vegetation is sedges and willows. Canopy cover is approximately 10-20% due to its location within a partially burned area.

Spring 153 in Moonlight Valley (UTM: 685533E 4455663N; 5480' elevation): This is a small pond/ spring (10m X 5m), with depths up to 2m. Most of the surrounding and emergent vegetation is sedges and reeds. Canopy cover approaches 0% due to its location within a meadow.

M093 Pond 1 (UTM: 703162E 4452745N; 5024' elevation): This is a small pond (approx. 20m X 3m) with emergent grass, reeds, and brush. Depth is 1-2 meters deep. It is bordered by a thin dry meadow (M093) which drains into Boulder Creek. Canopy cover is almost 0% as it falls within an open meadow.

M093 Pond 2 (UTM: 703134E 4452747N; 5020' elevation): This is a small pond (approx. 6m X 3m) with emergent grass, reeds, and other forbs. Depth is 2-3 meters deep. It is bordered by a thin dry meadow (M093) which drains into Boulder Creek. Canopy cover is almost 0% as it falls within an open meadow.

M093 Pond 3 (UTM: 703134E 4452747N; 5018' elevation): This is a small pond (approx. 10m X 10m) with emergent grass, reeds, and other forbs. Depth is 1-2 meters deep. It is bordered by a thin dry meadow (M093) which drains into Boulder Creek. Canopy cover is about 5%% as it falls within an open meadow.

Protocol-level surveys were conducted according to the schedule and survey durations in Table 1. No California red-legged frogs were detected during any surveys.

D. Plumas National Forest Species of Interest

Several non-target species from Plumas National Forest's list of threatened, endangered, proposed, sensitive species, species of special concern, birds of conservation concern and species of interest (collectively, referred to as Species of Interest) were detected throughout the project area. These included long-toed salamander (*Ambystoma macrodactylum*), Pacific treefrog (*Pseudachris regilla*), rainbow trout (*Oncorhynchus mykiss*), rubber boa (*Charina bottae*), Sierra newt (*Taricha sierrae*), black-backed woodpecker (*Picoides arcticus*), bald eagle (*Haliaeetus leucocephalus*), and California spotted owl (*Strix occidentalis occidentalis*). See Appendix A for locations of Species of Interest. In addition, other amphibian and reptile species were detected during surveys of the habitat including mountain gartersnake (*Thamnophis elegans*), Sierra gartersnake (*Thamnpohpis couchii*), gopher snake (*Pituophis catenifer*), alligator lizard (*Elgaria coerulea*), western rattlesnake (*Crotalus oreganus*), bullfrog (*Lithobates catesbeianus*), and western toad (*Anaxyrus boreas*). These latter species were indicated on datasheets but not mapped.

Table 1. Dates and survey duration for protocol-level California red-legged frog surveys conducted at the Moonlight Amphibian and Western Pond Turtle Project, June through September 2016.

Habitat	Daytime survey 1	Hrs	Nighttime survey 1	Hrs	Daytime survey 2	Hrs	Nighttime survey 2	Hrs
M056 pond	6/28/2016	1.5	8/30/2016	2.5	8/30/2016	1.0	9/29/2016	2.0
M091 pond	6/29/2016	3.0	6/28/2016	1.5	8/31/2016	1.0	8/31/2016	2.0
Antelope Creek pond	6/28/2016	1.0	6/29/2016	1.0	NH		NH	
Elephant's Playground 1	6/26/2016	1.0	NH		NH		NH	
Elephant's Playground 2	6/26/2016	1.0	NH		NH		NH	
Moonlight Valley Pond 4	6/30/2016	1.0	8/10/2016	1.0	8/10/2016	1.0	9/27/2016	1.0
Spring 153	6/30/2016	1.0	8/10/2016	1.0	8/10/2016	1.0	9/27/2016	1.0
M093 pond 1	8/3/2016	1.0	8/25/2016	1.0	9/26/2016	1.0	9/26/2016	1.0
M093 pond 2	8/3/2016	1.0	8/25/2016	1.0	9/26/2016	1.0	9/26/2016	1.0
M093 pond 3	8/3/2016	1.0	8/25/2016	1.0	9/26/2016	1.0	9/26/2016	1.0

E. Changes to Government-Designated Habitat

Before, during, and between surveys, several sections of Government-designated habitat were deemed to be non-suitable for the target species. These were tracked each week on dataforms and included in a GIS shapefile for submittal to the Government in the Final Report. Table 2 shows the adjustments made to the amount of stream, meadow, spring, and lake/ pond habitat in the project area for the 2015 survey season (see Figure 4 for map) and Table 3 shows the adjustments for the 2016 survey season (see Figure 5 for map). In addition, there were many sections of new habitat discovered by surveyors in 2015, including 58 springs, 9 meadows, 11 ponds, and 3 stream miles. In 2016, an additional 18 springs, 2 meadows, 20 ponds, and 2 stream miles were discovered and surveyed. Figures 5 and 6 show all Government-designated habitat determined to be suitable, Government-designated habitat determined to be non-habitat, and contractor-discovered new habitat in 2015 and 2016, respectively.

Table 2. Original amount of Government-designated survey habitat and final amount of confirmed habitat suitable for target species surveyed for in the Moonlight Amphibian and Pond Turtle Survey project, Plumas National Forest, in 2015. Any difference in the amounts was considered non-habitat for the purposes of survey for the target species.

Habitat Type	Original Government-designated Amount	Confirmed Habitat by Contractor
Stream Miles	479	287
Springs	345	158
Meadows	229	104
Lakes/ ponds	37	27

Table 3. Original amount of Government-designated survey habitat and final amount of confirmed habitat suitable for target species surveyed for in the Moonlight Amphibian and Pond Turtle Survey project, Plumas National Forest, in 2016. Any difference in the amounts was considered non-habitat for the purposes of survey for the target species.

Habitat Type	Original Government-designated Amount	Confirmed Habitat by Contractor
Stream Miles	479	289
Springs	345	176
Meadows	229	126
Lakes/ ponds	37	24

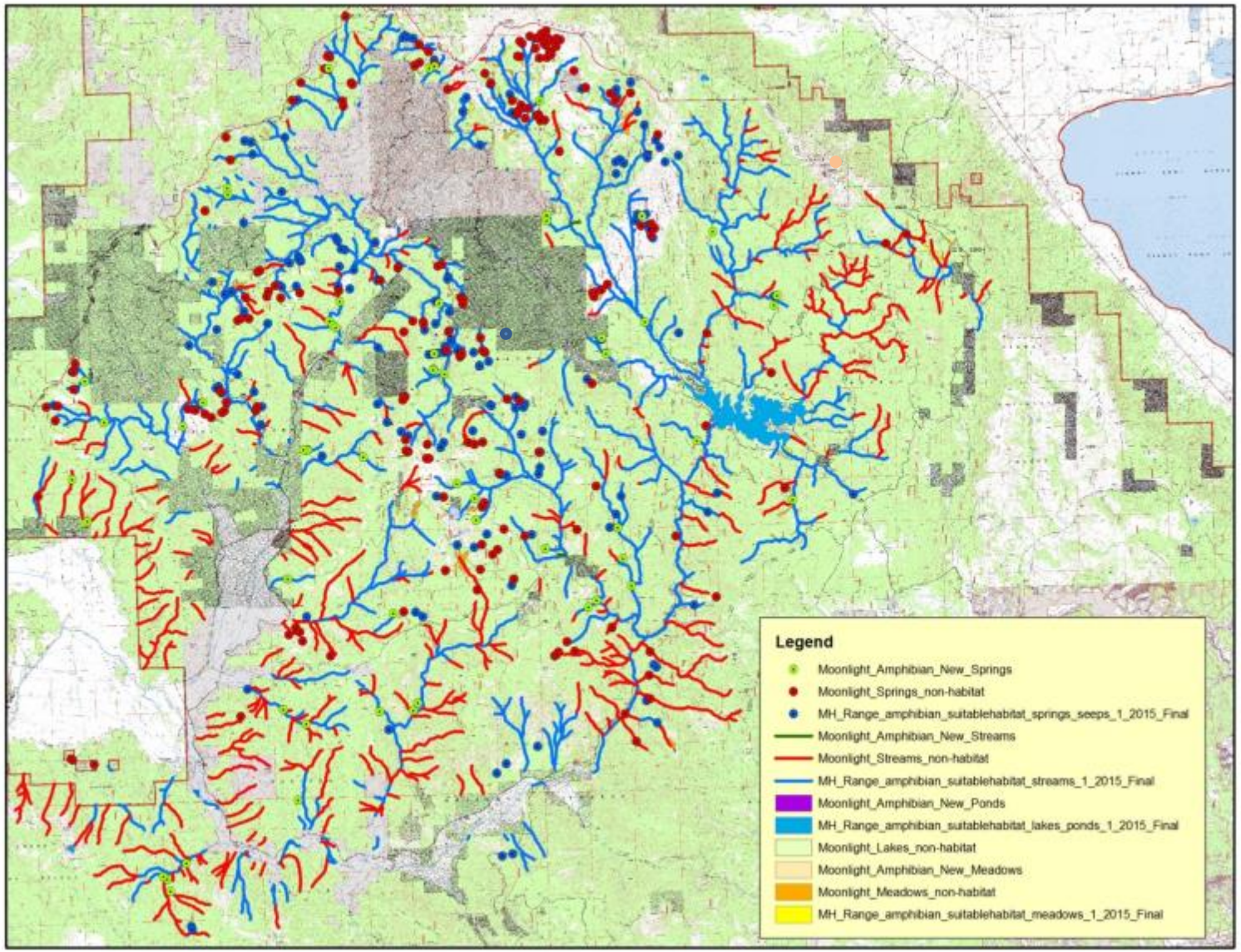


Figure 5. Final survey map of the Moonlight Amphibian and Western Pond Turtle survey project on the Plumas National Forest, 2015, showing Government-designated habitat determined to be suitable or non-habitat, and new contractor-discovered habitat.

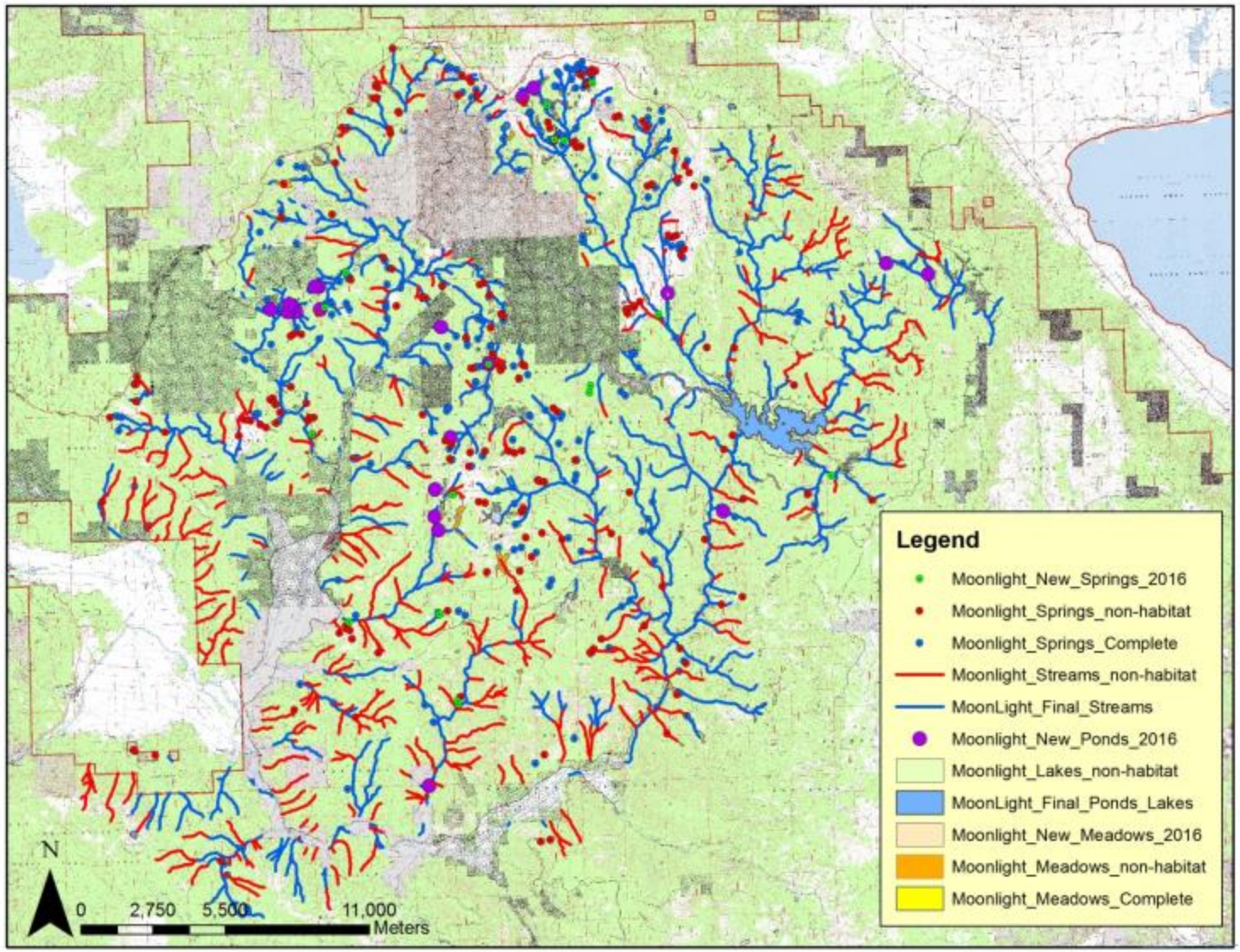


Figure 6. Final survey map of the Moonlight Amphibian and Western Pond Turtle survey project on the Plumas National Forest, 2016, showing Government-designated habitat determined to be suitable or non-habitat, and new contractor-discovered habitat.

V. QUALITY CONTROL METHODS, RESULTS, AND ASSESSMENT

Quality Control (QC) Methods, Assessment and Discussion

We implemented Quality Control methods as outlined in our Survey Plan. Those methods are summarized below:

Field Survey and Follow-up Surprise Inspections. If either of the Project Managers was not already in the field completing surveys with crews, they made check-ups to the field crews, performing surveys or inspecting them for at least 2 days every two weeks.

Track Logs of Surveyor Movements during Field Survey. All Garmin recreational grade GPS units have a "tracking" feature. This allows for a log, or track, of waypoints showing the surveyors' movements through space. Tracks are downloadable onto a mapping program as track-files or shapefiles. Track logs can then be assessed for surveyor progression through terrain using these GPS units and can be later inspected by the Contractor for surveyors' proximity to each section of habitat and movement between through suitable habitat. Track logs cannot be manipulated on the actual unit, before being downloaded. To guarantee to the Government that MGW surveyors are thoroughly surveying all Government-designated and Contractor-discovered survey habitat, we downloaded and submitted GPS track-logs as shapefiles for over 1/3 of all surveys. Our survey plan proposed that we would submit track-logs for 1/3 of all habitat.

Quality Control Re-surveys. We also implemented a re-survey protocol in which we attempted to survey for a second time, 2% of all stream miles, springs, meadows, or ponds/ lakes for all the scoped species. This serves as a second chance to discover Scoped Species and maximize likelihood of detecting elusive species in complex habitats.

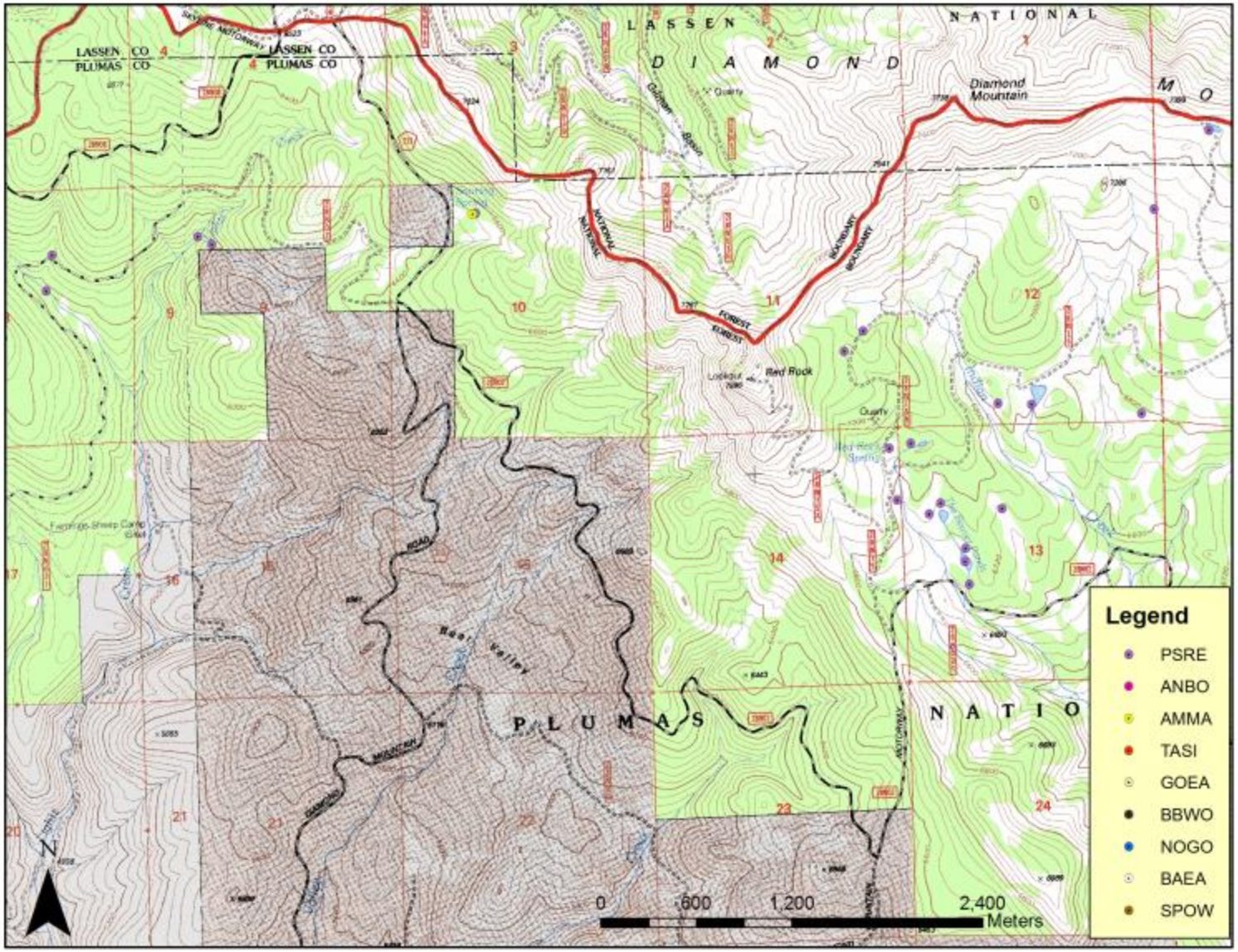
Survey Forms. First, all survey datasheets were completed no later than the day after the survey occurs. Second, all forms were inspected for completeness, consistency, and legibility by the Project Manager. If the Project Manager was not present during the survey, the Crew Leader inspected the data form, and it was again inspected by the Project Manager. Any inconsistencies detected through inspection of the data forms were discussed among the crew and corrected on the data form immediately.

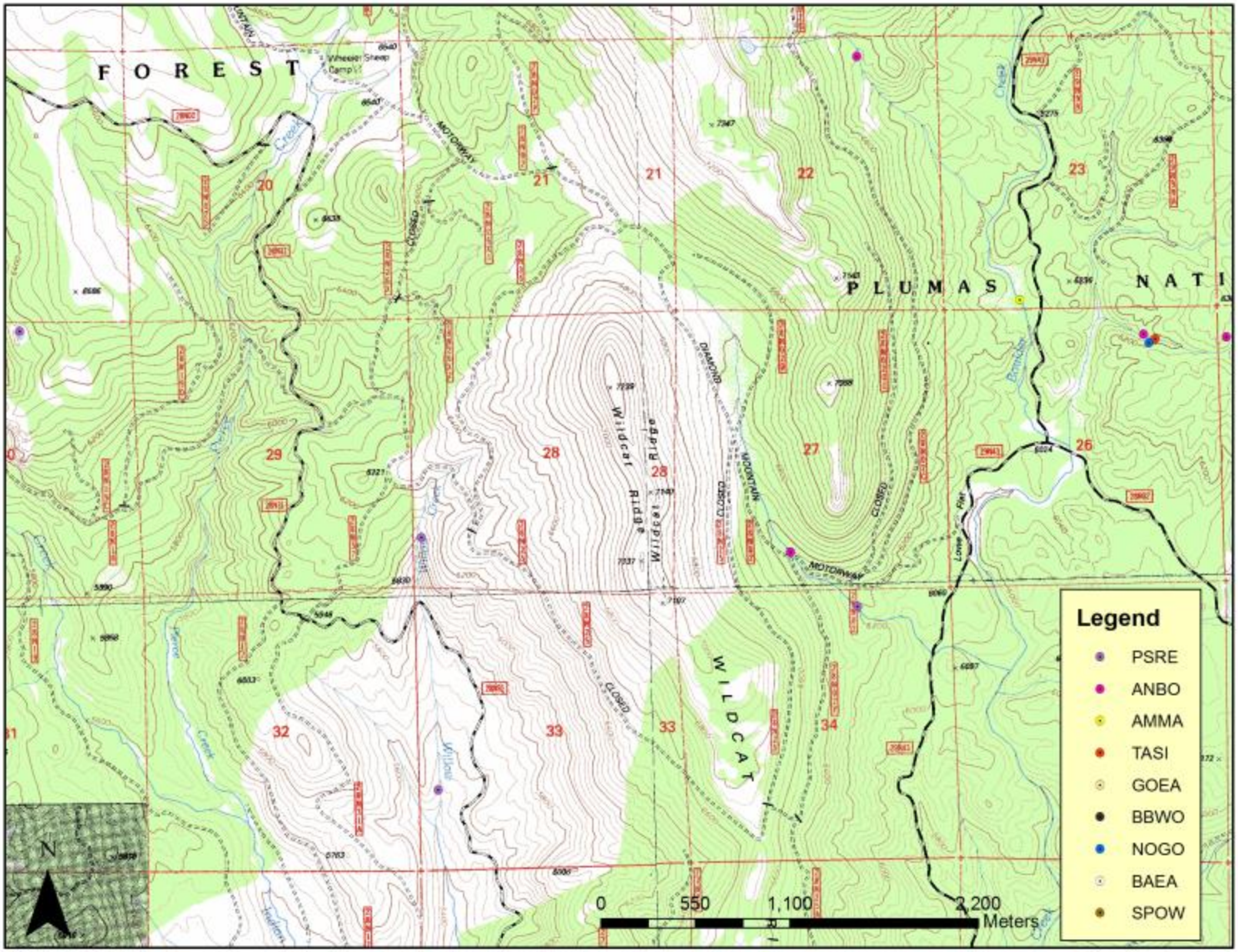
QC Results

We collected and downloaded over 1/3 of all surveyor movements for all surveys performed under this contract. This exceeded that proposed in our Quality Control Plan approved by the Government (1/3 of all surveys). We proposed to re-survey for Quality Control purposes 2% of the suitable habitat for a second time. In 2015, we conducted re-surveys of several different water bodies and achieved 2% re-survey goals for springs, meadows, and ponds/ lakes but

only about 1% for stream miles. In 2016, we achieved greater than our 2% re-survey goals for stream miles, meadows, and ponds. Dataforms for Quality Control surveys are indicated as such (*QC Resurvey). Quality control checking of field forms by the Project Manager resulted in much more accurate and complete field data reporting. In many instances, dataforms were found to be incomplete, and the Project Manager was able to catch these omissions prior to submittal.

APPENDIX A. Plumas Species of Interest Maps: PSRE = Pacific treefrog (*Pseudachris regilla*), ANBO = western toad (*Anaxyrus boreas*), AMMA = long-toed salamander (*Ambystoma macrodactylum*), TASI = Sierra newt (*Taricha sierrae*), BBWO = black-backed woodpecker (*Picoides arcticus*), BAEA = bald eagle (*Haliaeetus leucocephalus*), SPOW = California spotted owl (*Strix occidentalis occidentalis*), NOGO = northern goshawk (*Accipiter gentilis*), GOEA = golden eagle (*Aquila chrysaetos*)

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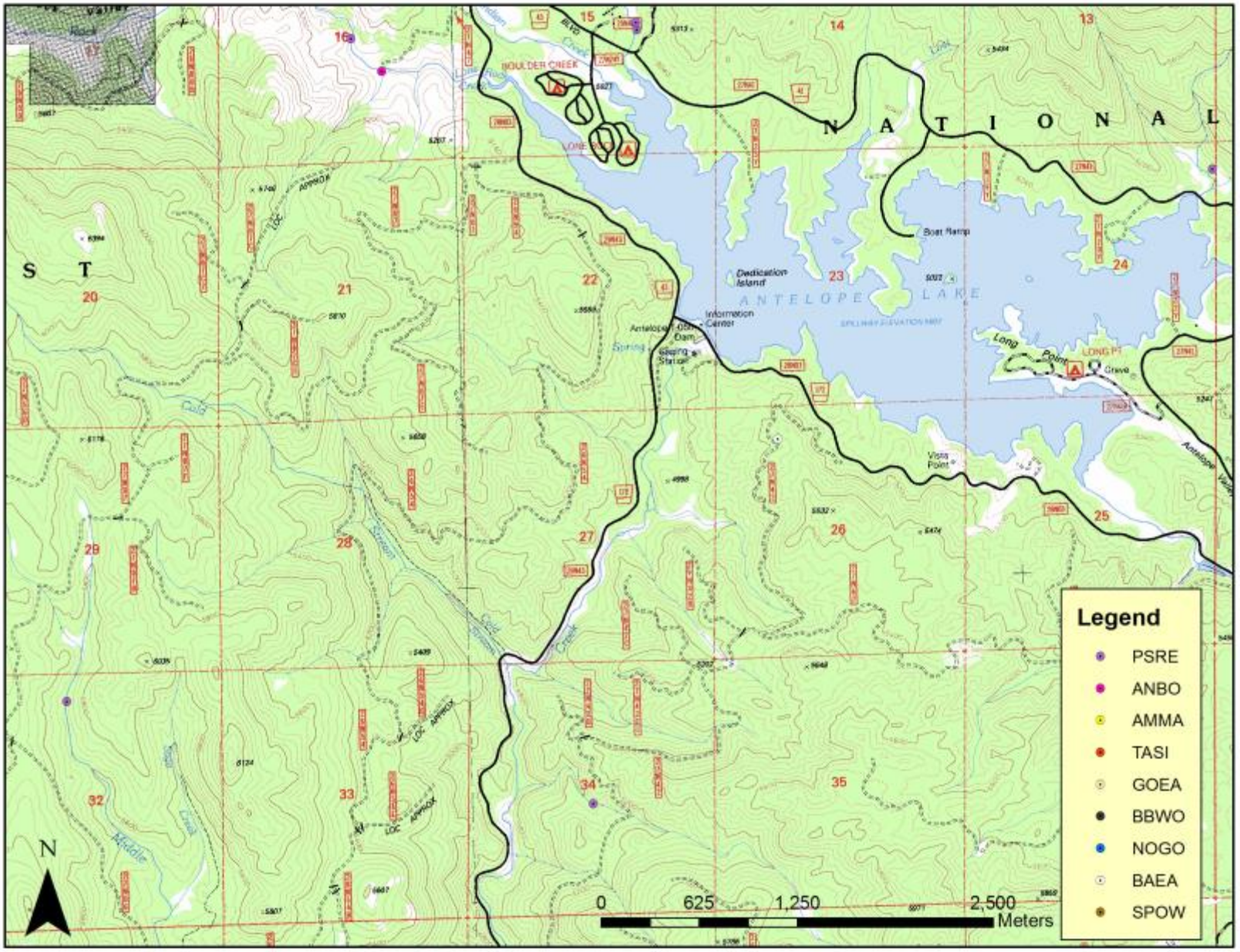
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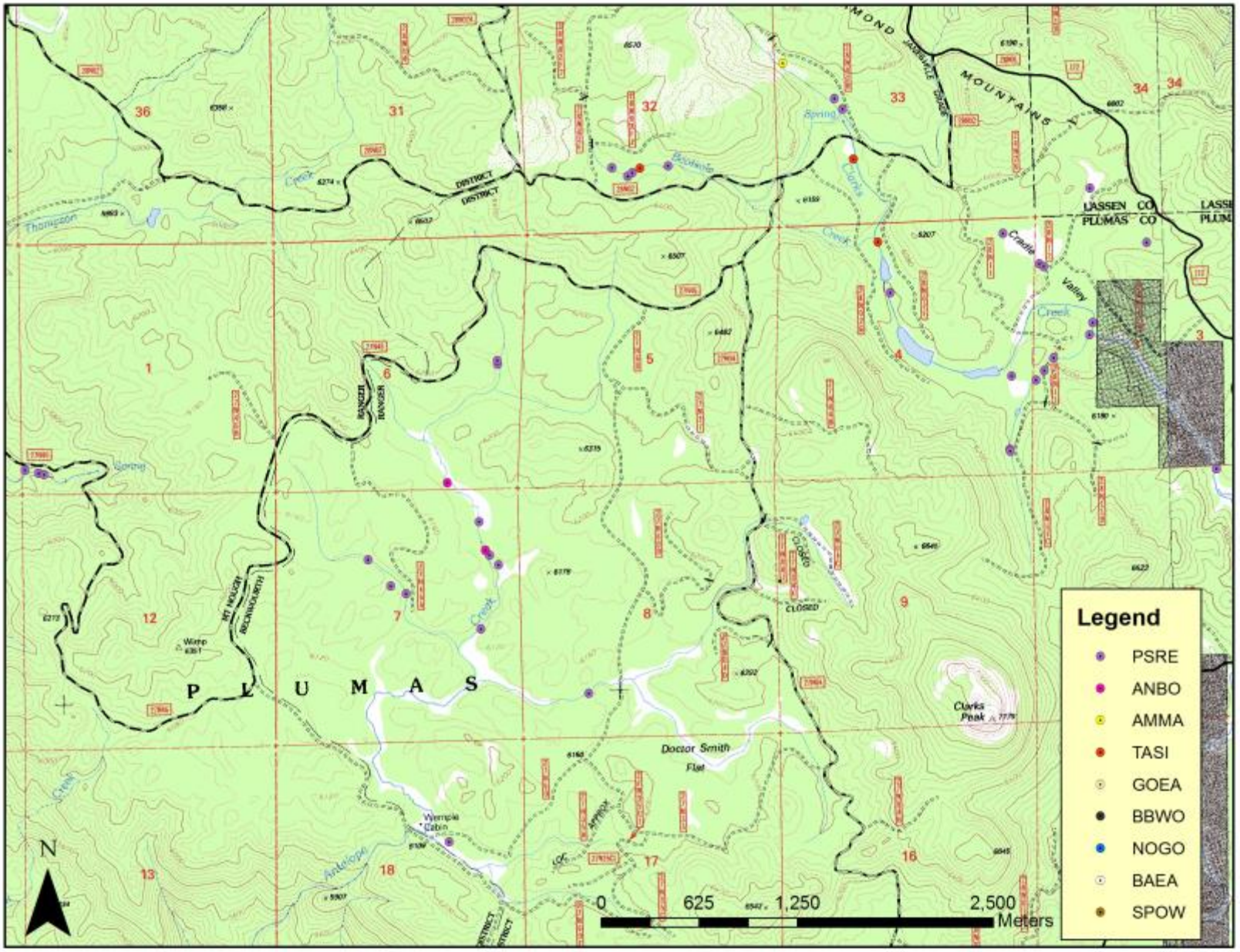
Cold Creek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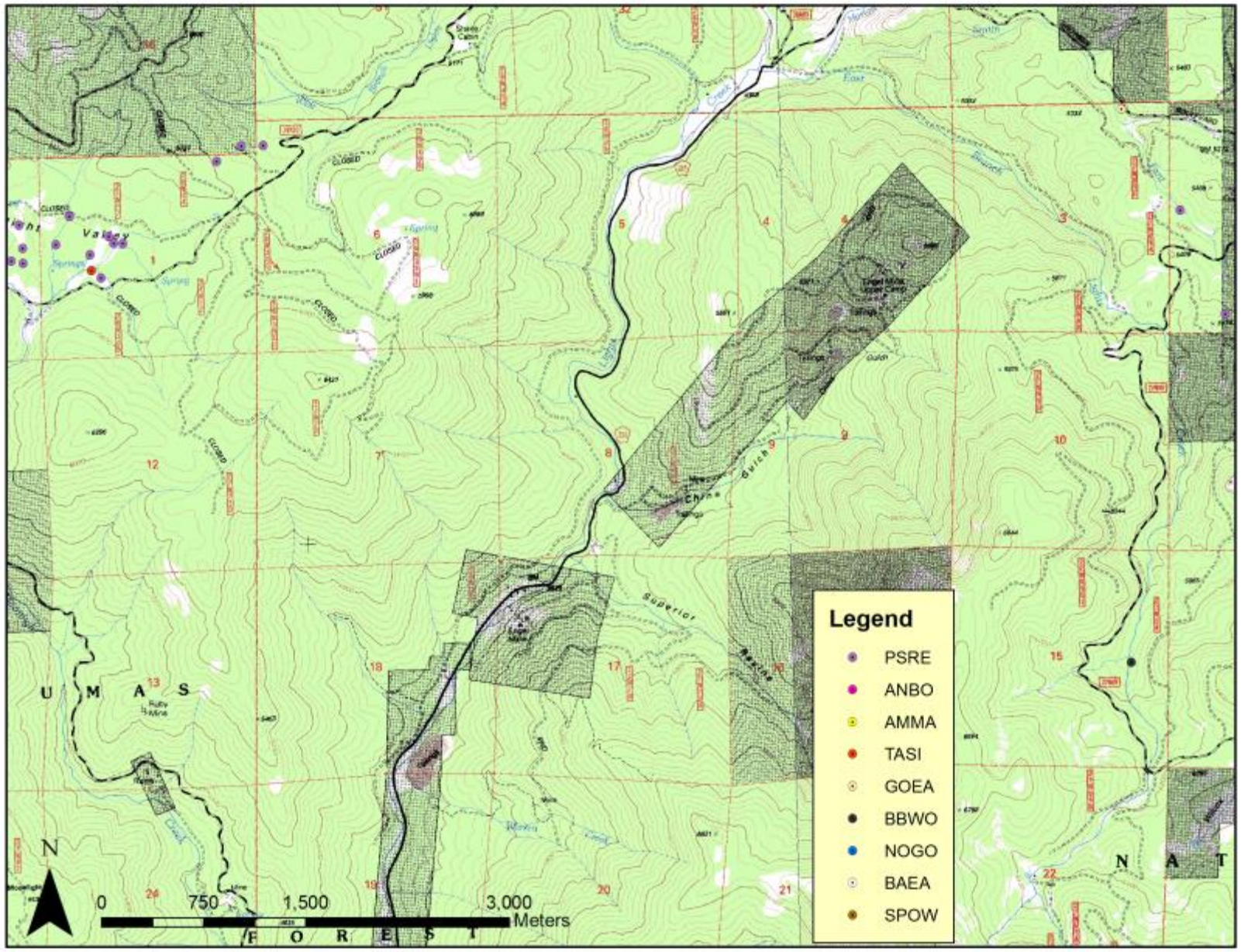
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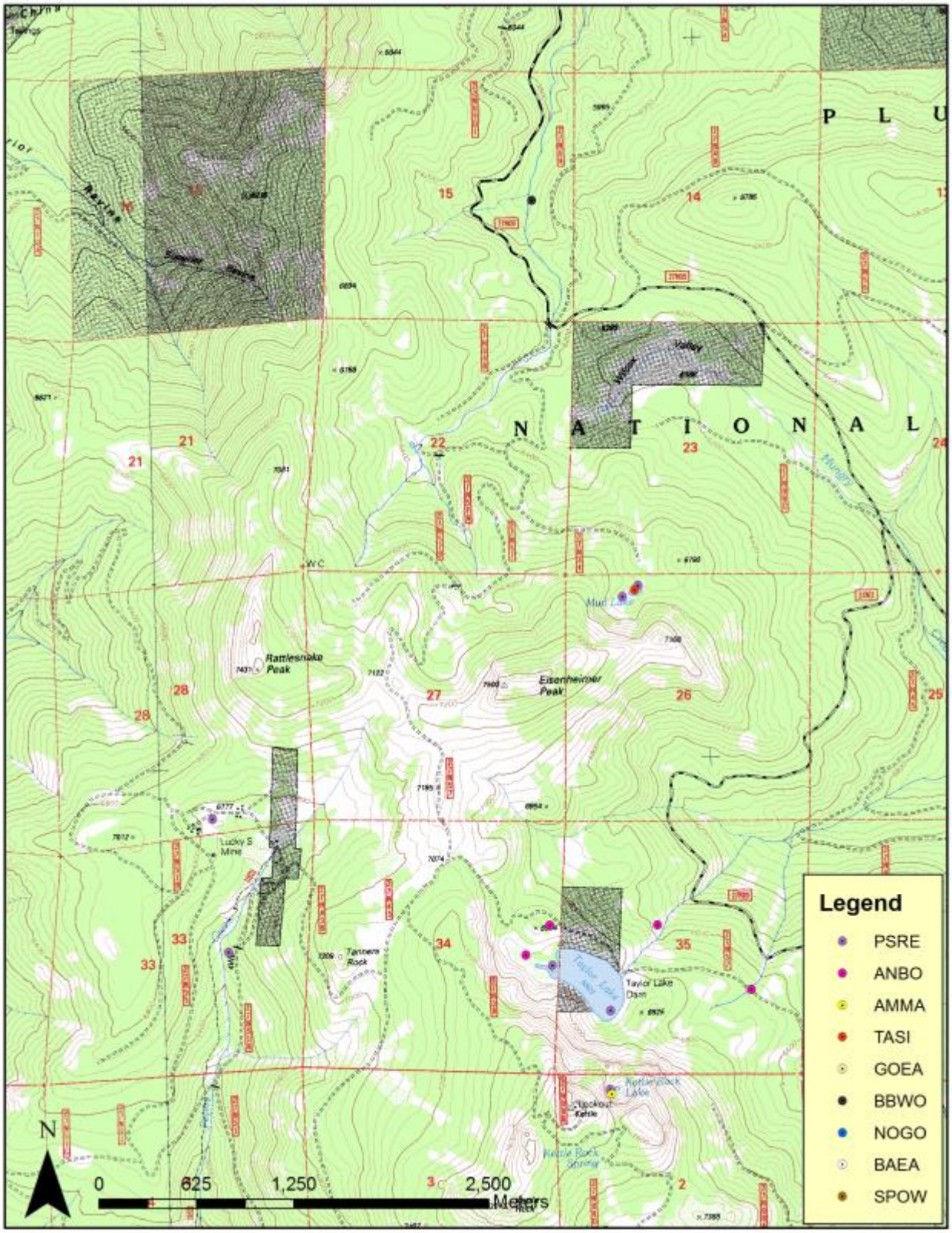
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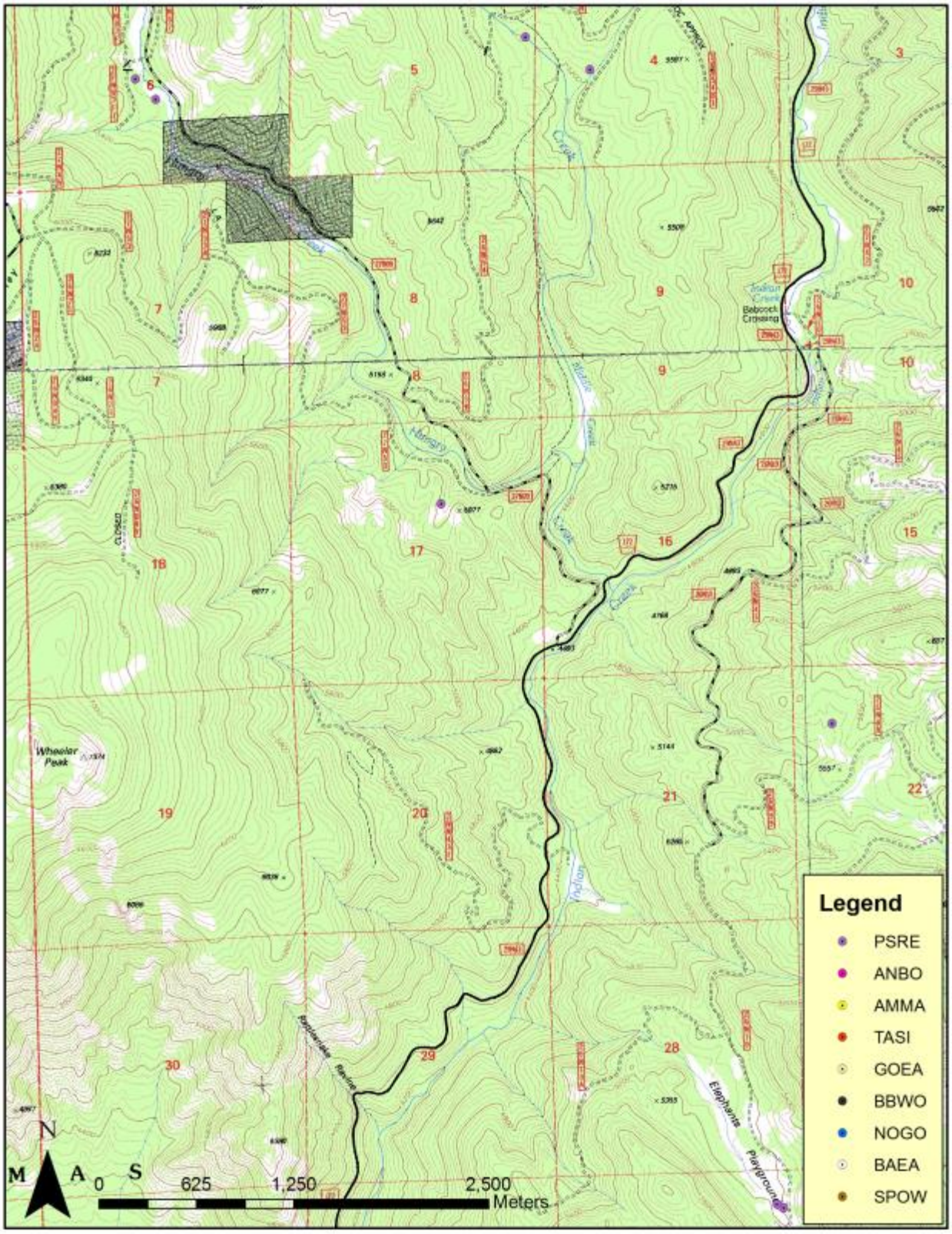
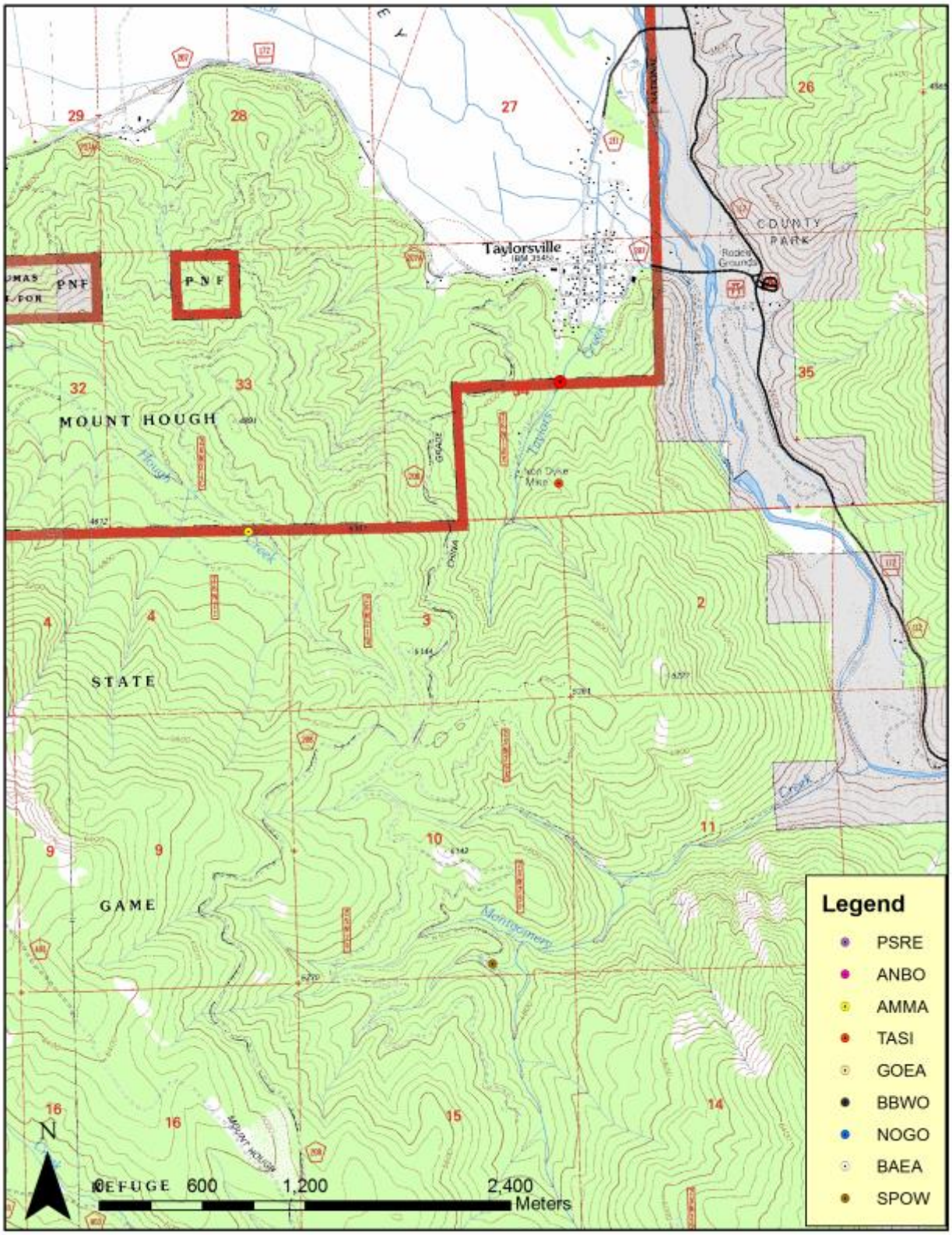
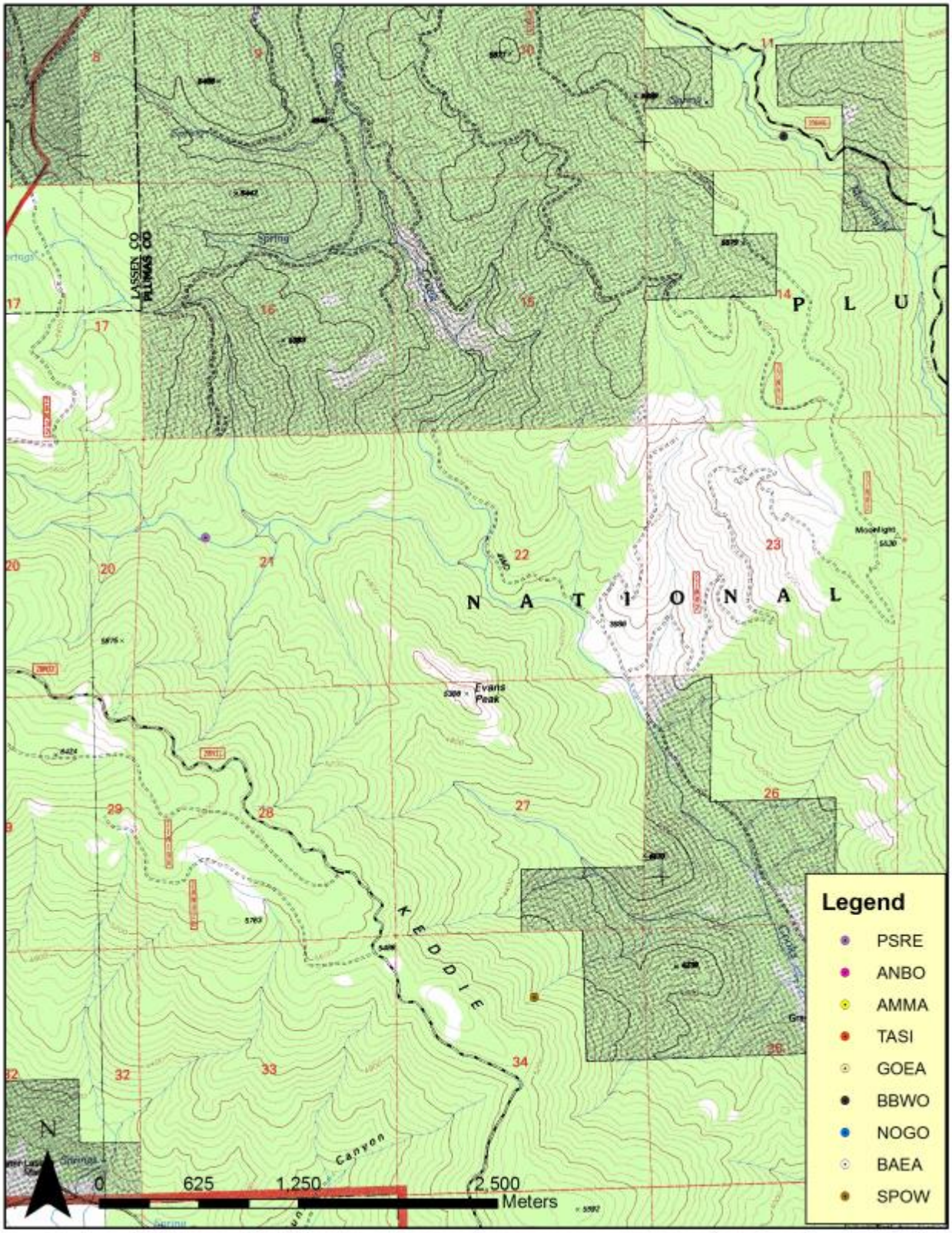
Mud Lake
Lucky S Mine
Tanners Rock
Taylor Lake Dam
Kettle Rock Lake
Lookout Kehle
NATIONAL


Legend
PSRE
ANBO
AMMA
TASI
GOEA
BBWO
NOGO
BAEA
SPOW
N
M A S
0
625
1,250
2,500
Meters
Wheeler Peak
Babcock Crossing
Elephants Playground


Taylorsville
MOUNT HOUGH
STATE
GAME
COUNTY PARK
PNF
PNF
Legend
PSRE
ANBO
AMMA
TASI
GOEA
BBWO
NOGO
BAEA
SPOW
N
0
600
1,200
2,400
Meters


LASSEN CO
PLUMAS CO
Spring
Evans Peak
Moonlight
KEDDIE
Canyon
N
0
625
1,250
2,500
Meters
Legend
PSRE
ANBO
AMMA
TASI
GOEA
BBWO
NOGO
BAEA
SPOW

APPENDIX B. Distribution of streams in the Moonlight Amphibian and Western Pond Turtle survey project area on the Plumas National Forest, 2015-2016 with presence of rainbow trout (*Oncorhynchus mykiss*).